CLAIMS

The embodiments of the invention for which an exclusive privilege or property is claimed, are defined as follows:

1. A sliding vane rotary combustion engine, which is characterised having at least one rotary compressor and at least one rotary turbine, an ignition and a combustion system.

2. A rotary compressor of claim 1, having a circularly cylindrical rotor, rotatably and eccentrically mounted within the compressor housing having intake and exhaust ports. Said rotor cylindrical outer boundary, being sealingly mounted tangent to the chamber inner peripheral such that the rotor outer boundary and the chamber inner peripheral are forming osculating planes. Said rotor having an internal vane groove, aligned along its diametrical axis.

3. The compressor rotor of claim 2, receiving a single rigid sliding vane, sealingly and movably mounted within the rotor groove. Both tips of the sliding vane are extending radially outward from the said rotor vane groove and are sealingly contacting the cycloidal inner surface of the housing peripheral. Said sliding vane has a radial reciprocating movement guided by the groove in the rotor in such a way that, as the rotor rotates, sealing means at both tips of the vane are in sealing contact with the cycloidal inner surface of the housing peripheral at all rotational angle positions of the said rotor.

4. Sliding vane of claim 3, thus defining a plurality of working chambers placed sequentially within the crescent shaped cavity bounded by the compressor housing inner peripheral and the rotor outer surface thereof, said working chambers are delimited by the housing inner peripheral, the rotor outer surface and the side surface of the sliding vanes. A plurality of sealing means fixed to each radially outer tips of the said sliding vane for pressure sealing the various working chambers of the compressor from each other. Said working chambers being the intake chamber receiving the fluid, said fluid being in gas, in liquid or in any mixture form; the fluid confinement chamber and the fluid compression chamber. As a result of the rotation

of the rotor, a periodic sequence of compressed fluid is delivered to the exhaust port of the compressor housing.

5. The compressor rotor of claim 2, has a rotor axis which receives a pivot axle vane retention mechanism which is comprised of a pin and an pivot axle, thereof the pin head fits into the vane center socket. The remaining length of the rotatable pin is mounted within an eccentrically drilled hole of the pivot axle. Roller, gear or sliding head of said pivot axle is engaging the cylindrical rotor inner peripheral to guide the vane through its eccentric rotating and reciprocating sliding motion.

6. A rotary combustion engine of claim 1, wherein said compressor casing is sealed at its opposite ends by plates. Wherein said plates are apertured at their center line, said aperture having bearing, sealing and lubricating means therein to support, seal and lubricate the ends of said drive shaft protruding therefrom.

7. A rotary turbine of claim 1, having a circularly cylindrical rotor, rotatably and eccentrically mounted within the turbine housing having intake and exhaust ports. Said rotor cylindrical outer boundary, being sealingly mounted tangent to the chamber inner peripheral such that the rotor outer boundary and the chamber inner peripheral are forming osculating planes. Said rotor having an internal vane groove, aligned along its diametrical axis.

8. The turbine rotor of claim 7, receiving a single rigid sliding vane, sealingly and movably mounted within the rotor groove. Both tips of the sliding vane are extending radially outward from the said rotor vane groove and are sealingly contacting the cycloidal inner surface of the housing peripheral. Said sliding vane has a radial reciprocating movement guided by the groove in the rotor in such a way that, as the rotor rotates, sealing means at both radially outer tips of the vane are in sealing contact with the cycloidal inner surface of the housing peripheral at all rotational angle positions of the said rotor.

9. Sliding vane of claim 7, thus defining a plurality of working chambers placed sequentially within the crescent shaped cavity bounded by the turbine housing inner peripheral and the rotor outer surface thereof, said working chambers are delimited

by the housing inner peripheral, the rotor outer surface and the side surface of the sliding vanes. A plurality of sealing means fixed to each tips of the said sliding vane for pressure and temperature sealing the various working chambers of the turbine from each other. Said working chambers being the combustion chamber; the expansion chamber and, the exhaust chamber. A periodic sequence of expanded fluid is delivered from the exhaust port of the turbine housing with rotation of the turbine rotor in response to high pressure and temperature gas expansion in the said turbine.

10. The rotary turbine housing of claim 7, having the cycloidal inner housing peripheral, the rotor outer diameter and the sliding vane thickness sized in such a way that burned gas pressure is lowered to about local ambient pressure values when the expansion chamber volume reaches its maximum.

11. The rotary turbine of claim 7 and its components sized according to claim 10, having the cycloidal inner housing and the rotor height sized in such a way that, the pressure of the gas, as it is being transferred from the compressor chamber is maintained to about a fairly constant value.

12. The turbine rotor of claim 7, has a rotor axis which receives a pivot axle vane retention mechanism which is comprised of a pin and an pivot axle, thereof the pin head fits into the vane center socket. The remaining length of the rotatable pin is mounted within an eccentrically drilled hole of the pivot axle. Roller, gear or sliding head of said pivot axle is engaging the cylindrical rotor inner peripheral to guide the vane through its eccentric rotating and reciprocating sliding motion.

13. A rotary combustion engine of claim 1, wherein said turbine casing is sealed at its opposite ends by plates. Wherein at least one of the said plates are apertured at their center line, said aperture having bearing, sealing and lubricating means therein to support, seal and lubricate the ends of said drive shaft protruding therefrom.

14. A drive shaft of claim 1, journalled in bearings supported by the engine casing and coupled to the compressor and turbine rotors for power and torque transfer and for synchronized rotation thereof; a plurality of sealing means for sealing the said

drive shaft in the said rotary engine casing. Wherein the compressor and the output shaft are powered by the combusted gas expanding through the turbine. Said compressor housing adjacent to turbine housing and, said compressor rotor coaxial with said turbine rotor.

15. A drive shaft, gear or other transmission mechanisms of claim 1, journalled in bearings supported by the engine casing and coupling the compressor and turbine rotors for power and torque transfer and for synchronized rotation thereof; a plurality of sealing means for sealing the said drive shaft in the said rotary engine casing. Wherein the compressor and the output shaft are powered by the combusted gas expanding through the turbine. Said compressing and turbine housings arranged in tandem and, said compressor rotor coupled with said turbine rotor through a shaft, gear or other power and torque transmission mechanisms.

16. A fluid transfer passage of engine of claim 1, connected between the exhaust port of the compressor and the intake port of the turbine. The transfer passage including a combustion chamber, said combustion chamber being periodically pressurised by gas flow from the compressor exhaust port. Downstream of said compressor exhaust port comprises at least one check valve, and/or at least a rotary vane combustion chamber valve, and/or at least one cyclo-valve, all said valves operating between open and closed positions, in timed sequence with the passage of the turbine sliding vane in front of the intake port of the turbine housing. The closed position preventing gas flow from the combustion chamber into the compressor. Said cyclo-valve comprises a tubing, having inlet and exhaust ports and a rotatably and sealingly mounted slotted cylinder within the said tubing.

17. A fluid transfer passage of engine of claim 1, connected between the exhaust port of the compressor and the intake port of the turbine. The transfer passage comprises at least one check valve and/or at least one cyclo-valve, all said valves operating between open and closed positions, in timed sequence with the passage of the turbine sliding vane in front of the intake port of the turbine housing. The closed position preventing gas flow from the turbine combustion and expansion chamber into the compressor. Said cyclo-valve comprises a tubing, having inlet and exhaust ports and a rotatably and sealingly mounted slotted cylinder within the said tubing.

18. A fuel or a fuel/atomiser mixture supply means penetrating the said rotary engine casing and connected to said combustion chamber, wherein said fuel or fuel/atomiser mixture supply means comprise one of either a fuel injection means or a fuel aspiration means; a fuel/oxidizer mixture ignition means penetrating the said engine casing and connected to said combustion chamber, wherein said fuel/oxidiser ignition means comprise one of either a spark ignition means or a pressure ignition means; means for isolating the combustion products in the combustion chamber and in the expansion chamber from the compression chamber and the exhaust port during expansion thereof; an exhaust gas removal means penetrating said rotary engine casing and connected to said turbine exhaust port.

19. A heat of combustion removal means penetrating said rotary engine of claim 1, casing and surrounding said rotary engine and said connected to an external coolant recirculating means and external heat radiation means.

20. A plurality of lubrication means for lubricating all of the moving parts of the rotary engine of claim 1; and wherein, for each 360 degrees of rotation of said compressor and turbine rotors, there are two complete and consecutive cycles of intake, compression, combustion, power and exhaust phases.

21. A method of machining and manufacturing the cycloidal shape of the housing inner peripheral of said compressor and of said turbine of claim 1, wherein the corresponding cycloidal shape is obtained from the largest circle that fits the said inner peripheral and by enlarging the said circle in such a way that, as the rotor rotates around its eccentrically placed axis over a range $0° \leq \theta \leq 180°$, the radially outer tips of the springless vane of claim 3 and 8, define the said cycloidal shape of the housing inner peripheral. The exact coordinates of such cycloidal shape being implemented as described in this claim, in the precision manufacturing of the housing inner peripheral of said compressor and of said turbine of claim 1, using modern manufacturing techniques, including using CNC techniques.

22. A method for a rotary combustion engine of claim 1, said engine includes an intake, a compressor, a combustor, a turbine, an exhaust and having a thermodynamic cycle.

23. The thermodynamic cycle of claim 22; wherein fluid is introduced during the intake phase, at pressures about ambient pressure.

24. The thermodynamic cycle of claim 22; wherein fluid is introduced during the intake phase at pressures greater than ambient pressure.

25. The thermodynamic cycle of claim 22, wherein the intake phase, described either in claims 23 or 24, is followed by a substantially isentropic compression process.

26. The thermodynamic cycle of claim 22, wherein the compression process of claim 25 is followed by the heat input phase comprised of a substantially constant volume combustion process, subsequently followed by a substantially constant pressure combustion process.

27. The thermodynamic cycle of claim 22, wherein the compression process of claim 25 is followed by the heat input phase comprised of a substantially constant volume combustion process, subsequently followed by a substantially constant pressure combustion process, which is then followed by a substantially constant temperature combustion process.

28. The thermodynamic cycle of claim 22, wherein the compression process of claim 25 is followed by the heat input phase comprised of a substantially constant volume combustion process, subsequently followed by a substantially constant temperature combustion process.

29. The thermodynamic cycle of claim 22, wherein the heat input phase, described either in claims 26, 27 or 28, is followed by a substantially isentropic heat power delivery and expansion process, said process having an exhaust phase equal to ambient pressure.

30. The thermodynamic cycle of claim 22, wherein the heat input phase, described either in claims 26, 27 or 28, is followed by a substantially isentropic heat power delivery and expansion process, said process having an exhaust phase greater than ambient pressure.

31. A compound propulsion cycle engine which comprises single or a plurality of rotating wings, propellers, contra-rotating propellers, fans, contra-rotating fans, hub-turbine driven fans, axial compressor stage rows, centrifugal compressor stage rows, combustion chambers, axial turbine stage rows, radial turbine stage rows, rotary compressors, rotary turbines, reheat systems, intercooler systems.

32. A single or a plurality of rotating wings, propellers, contra-rotating propellers, fans, contra-rotating fans, hub-turbine driven fans, axial compressor stage rows, centrifugal compressor stage rows of claim 31, driven by rotary turbine of claim 1.

33. A single or a plurality of rotating wings, propellers, contra-rotating propellers, fans, contra-rotating fans, hub-turbine driven fans, axial compressor stage rows, centrifugal compressor stage rows of claim 31, simultaneously driven by rotary turbine of claim 1 and conventional axial and/or radial turbines.

34. A single or a plurality of rotating wings, propellers, contra-rotating propellers, fans, contra-rotating fans, hub-turbine driven fans, axial compressor stage rows, centrifugal compressor stage rows of claim 31, simultaneously driven by rotary or piston type internal or external combustion engines and axial and/or radial turbines.

35. A single or a plurality of axial and/or centrifugal turbine stage rows of claim 31, driving a single or a plurality of rotary compressors of claim 1.

36. A single or a plurality of axial and/or centrifugal turbine stage rows of claim 31, simultaneously driving a single or a plurality of rotary compressors of claim 1 and one or a plurality of the following comoponents: rotating wings, propellers, contra-rotating propellers, fans, contra-rotating fans, hub-turbine driven fans, axial compressor stage rows, centrifugal compressor stage rows.

37. Compound turbo rotary engine of claim 31, comprising said single or a plurality of rotary compressor supplying compressed fluid to said single or a plurality of rotary turbines. A single or a plurality of fluid transfer passages connected between the exhaust port of the rotary compressor and the intake port of the rotary turbine. Said transfer passage comprises at least one check valve and/or at least one cyclo-valve. Said fluid transfer passages may incorporate reheat systems upstream of rotary

engine combustion chamber inlet ports and/or intercooler systems upstream of rotary compressor inlet ports.

38. A single or a plurality of hub-turbine driven propeller of claim 31. Said hub-turbine driven propeller, comprising a circumferentially extending row of radially extending turbine blades and a circumferentially extending rows of radially extending fan or propeller blades thereof, concentrically disposed about and extending radially outwardly from the radial outer ends of said turbine blades. Said hub-turbine to receive the combusted product efflux from the said gas turbine combustor and to produce shaft power.